This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 02

26MAR2025

Do NOT write in this box. Your MARK will be placed here.

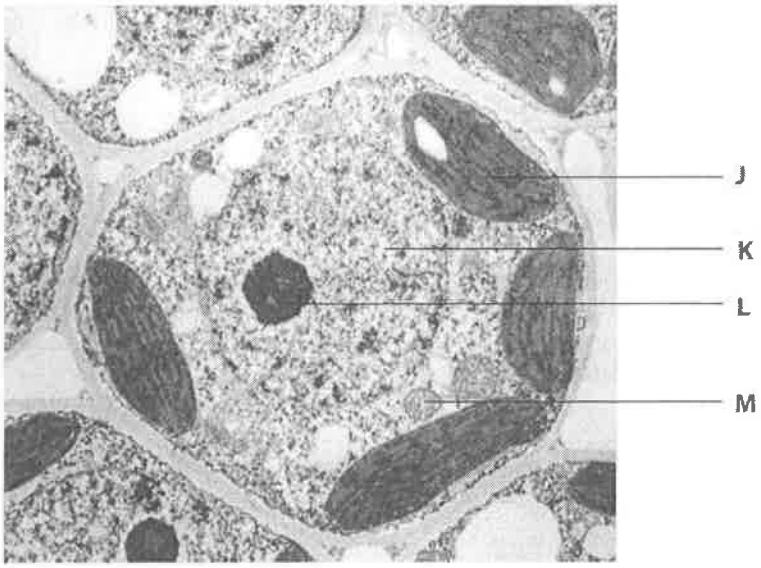
Subject :	A Level : Biology 1
Class :	11A12A
Teacher :	Miss Rahmeh Hilal
Duration :	1 hour
You are to answer the questions to this exam on : This exam paper	

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Q1.

The photograph below shows a plant cell as seen using an electron microscope.



Magnification ×20 000

(a) Place a cross ☒ in the box next to the number of structures labelled in the photograph that would also be present in an animal cell.

(1)

☐ **A** 1

☐ **B** 2

☐ **C** 3

☐ **D** 4

(b) The table below shows some features of plants cells and prokaryotic cells.

For each feature, place **one** cross ☒ in the appropriate box, in each row, to show whether it is found in plant cells only, prokaryotic cells only or in both plant cells and prokaryotic cells.

(3)

Feature	Plant cells	Prokaryotic cells	Plant cells and prokaryotic cells
cellulose cell wall	☐	☐	☐
nucleus	☐	☐	☐
ribosomes	☐	☐	☐

(c) Some plant cells contain plasmodesmata.

Describe the structure of plasmodesmata.

(2)

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(Total for question = 6 marks)

Q2.

Meiosis and mitosis are both types of nuclear division that take place in eukaryotic organisms.

(a) Put a cross ☒ in the box next to the correct word or words to complete each of the following statements.

(i) DNA synthesis takes place before

(1)

- ☐ **A** both meiosis and mitosis
- ☐ **B** meiosis only
- ☐ **C** mitosis only
- ☐ **D** neither meiosis nor mitosis

(ii) Crossing over takes place during prophase 1 in

(1)

- ☐ **A** both meiosis and mitosis
- ☐ **B** meiosis only
- ☐ **C** mitosis only
- ☐ **D** neither meiosis nor mitosis

(b) Put a cross ☒ in the box next to the row in the table that correctly describes the result of meiosis and the result of mitosis.

(1)

	Meiosis	Mitosis
☒ A	two daughter cells with one copy of each chromosome	four daughter cells with two copies of each chromosome
☒ B	two daughter cells with one copy of each chromosome	four daughter cells with one copy of each chromosome
☒ C	four daughter cells with one copy of each chromosome	two daughter cells with two copies of each chromosome
☒ D	four daughter cells with one copy of each chromosome	two daughter cells with one copy of each chromosome

(c) Suggest why neither meiosis nor mitosis take place in prokaryotic organisms.

(2)

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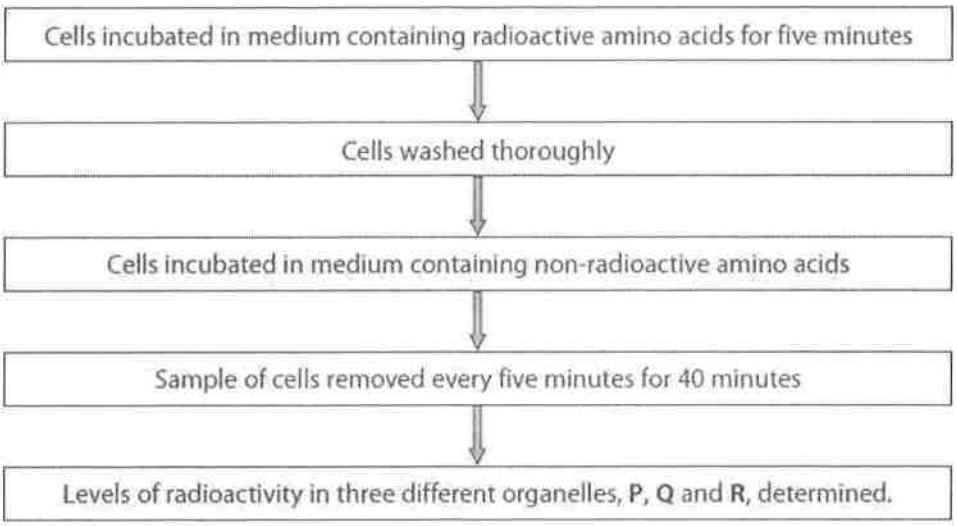
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(Total for question = 5 marks)

Q3.

An experiment was carried out to study the synthesis and movement of proteins through cells. The diagram below shows the method used.



The table below shows the results of this experiment.

Time / minutes	Level of radioactivity / arbitrary units		
	Organelle P	Organelle Q	Organelle R
5	60	0	0
10	80	40	0
15	20	70	0
20	15	80	10
25	10	30	30
30	5	20	60
35	5	10	40
40	5	5	20

(a) Place a cross ☒ in the box next to the row in the table that correctly identifies the three organelles **P**, **Q** and **R**.

(1)

	Organelle P	Organelle Q	Organelle R
☐ A	Golgi apparatus	ribosome	rough endoplasmic reticulum
☐ B	ribosome	rough endoplasmic reticulum	Golgi apparatus
☐ C	ribosome	Golgi apparatus	rough endoplasmic reticulum
☐ D	rough endoplasmic reticulum	ribosome	Golgi apparatus

(b) Suggest why the levels of radioactivity increased in organelle **P**.

(2)

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(c) (i) Describe the changes in the level of radioactivity in organelle **Q**.

(2)

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(ii) Explain the changes in the level of radioactivity in organelle **Q**.

(2)

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(d) (i) Suggest why the maximum level of radioactivity in organelle **R** was lower than the maximum level of radioactivity in organelle **P**.

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(ii) Suggest what will happen to the level of radioactivity in organelle **R** after 40 minutes. Give a reason for your answer.

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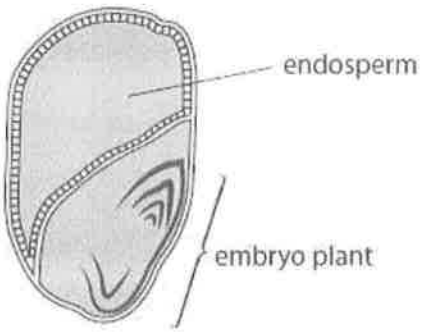
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(Total for question = 11 marks)

Q4.

Maize grains are formed after the transfer of pollen and the fusion of nuclei.

The diagram below shows the structure of a maize grain.



(a) Describe the role of the pollen tube nucleus.

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(b) Before a maize grain germinates, enzymes that break down starch are activated.

Explain why starch has to be broken down before the embryo plant can grow.

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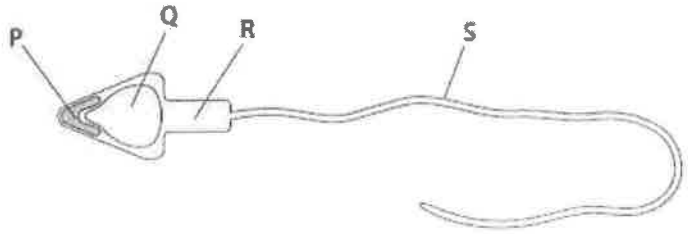
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(Total for question = 4 marks)

Q5.

The diagram below shows a sperm cell.



(a) Name the structure labelled **P**.

(1)

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(b) Place a cross ☒ in the box next to the structure that contains mitochondria.

(1)

☐ **A** **P**
☐ **B** **Q**
☐ **C** **R**
☐ **D** **S**

(c) Place a cross ☒ in the box next to the structure or structures that contain DNA.

(1)

☐ **A** **P** only
☐ **B** **P** and **R**
☐ **C** **Q** only
☐ **D** **Q** and **R**

(d) Describe the role of structure **S**.

(2)

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* (e) Explain the role of meiosis in the production of genetically variable sperm cells.

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(Total for question = 10 marks)

Q6.

In Japan, scientists have used stem cells from the skin of mice to produce gametes.

The stem cells were stimulated to give rise to cells that can produce gametes. These cells were implanted into sterile female mice that had been unable to produce egg cells. These female mice were then able to produce egg cells.

The photograph below shows one of these female mice with her offspring.



© SSP

Magnification ×1

(a) The allele for white fur is recessive. The scientists took a skin cell from a brown mouse and used it to grow egg cells in a sterile white mouse. These egg cells were fertilised with sperm from another white mouse.

All the offspring had brown fur.
Suggest what conclusion can be made from this observation.

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(b) Explain how the structure of an egg cell is related to its function as a gamete.

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(c) When the undifferentiated cells were implanted into the sterile female mice they gave rise to egg cells. These egg cells were genetically varied.

Suggest how these undifferentiated cells gave rise to genetically varied egg cells.

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(Total for question = 10 marks)

Q7.

Wheat is a crop plant.

The phenotype of wheat is determined by its genotype and the environment.

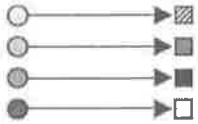
(a) The colour of wheat grains is an example of polygenic inheritance. It is also an example of a character that shows continuous variation.

(i) Put a cross ☒ in the box next to the diagram that illustrates polygenic inheritance for the colour of wheat grains.

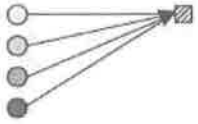
Each circle represents one gene and each square represents one character.

(1)

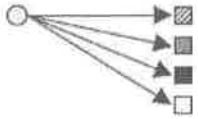
☐ **A**



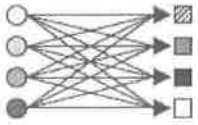
☐ **B**



☐ **C**

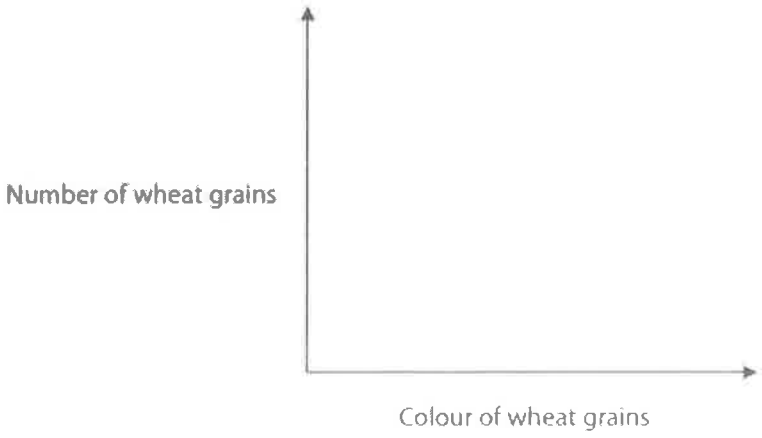


☐ **D**



(ii) Complete the graph below to show continuous variation for this character.

(1)



(Total for question = 2 marks)

Q8.

Bioplastics can be made from the polysaccharides starch and cellulose. These can be used to replace plastics derived from oil.

(a) The table below shows some features of starch and cellulose.

For each feature, put one cross (☒) in the appropriate box in each row, to show whether the feature is found in starch only, cellulose only, both starch and cellulose or in neither.

(4)

Feature	Starch only	Cellulose only	Both starch and cellulose	Found in neither starch nor cellulose
consists of two different polysaccharides	☐	☐	☐	☐
made from β glucose	☐	☐	☐	☐
1,4-glycosidic bonds present	☐	☐	☐	☐
hydrogen bonds between molecules	☐	☐	☐	☐

(b) Explain the advantages of using bioplastics compared with using plastics derived from oil.

(2)

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(c) A study was carried out into the effect of adding cellulose to a starch-based plastic.

The tensile strength of the plastic was measured.
The table below shows the results of this study.

Starch : cellulose ratio	Mean tensile strength / MPa	Standard deviation / MPa
100:0	10.0	± 0.5
100:2.5	13.9	± 0.9
100:5	14.0	± 1.5
100:10	26.8	± 0.8
100:15	26.0	± 1.2

Describe an investigation that could be carried out to confirm these results.

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(Total for question = 10 marks)

Q1.

Question Number	Answer	Mark
(a)	**The only correct answer is C as the nucleus, nucleolus and mitochondrion are found in animal cells** ***A** is not correct because the nucleus, nucleolus and mitochondrion are found in animal cells* ***B** is not correct because the nucleus, nucleolus and mitochondrion are found in animal cells* ***D** is not correct because chloroplasts are not found in*	(1)

Question Number	Answer	Mark
(b)		(3)

Feature	Plant cells	Prokaryotic cells	Plant cells and prokaryotic cells
cellulose cell wall	☒		
nucleus	☒		
ribosomes			☒

Only plant cells have cellulose cell walls. Prokaryotic cell walls are made of peptidoglycan. Plant cells are eukaryotic cells so have a nucleus. Prokaryotic cells do not have a nucleus. Ribosomes are found in both eukaryotic cells and prokaryotic cells, although their sizes are different.

Question Number	Answer	Additional guidance	Mark
(c)		**PIECE TOGETHER** e.g. "Areas where there is no cell wall and cytoplasm links two adjacent cells," gains mp1 and 2.	
	1. pores in the cell wall between (adjacent) cells / eq ; 2. idea that there is **cytoplasm** running through the plasmodesmata ;	**1. ACCEPT** gaps /channels / canals / holes as eq to pores **1. ACCEPT** references to bridges only if in the context of cell wall **1. ACCEPT** descriptions of no cell wall present **1. NOT** pits **2.IGNORE** ref to symplast **2.ACCEPT** cytoplasm-filled channel / cytoplasmic bridge **ACCEPT** labelled diagram with the above points for 2 marks	(2)

Q2.

Question Number	Answer	Additional Guidance	Mark
(a)(i)	**A** both meiosis and mitosis	***B*** *is incorrect because the DNA has to replicate before both mitosis and meiosis* ***C*** *is incorrect because the DNA has to replicate before both mitosis and meiosis* ***D*** *is incorrect because the DNA has to replicate before both mitosis and meiosis*	(1)
(a)(ii)	**B** meiosis only	***A*** *is incorrect because there is no prophase I in mitosis* ***C*** *is incorrect because crossing over there is no prophase I in mitosis* ***D*** *is incorrect because crossing over occurs in meiosis, prophase I*	(1)

Question Number	Answer	Additional Guidance	Mark
(b)	**C** four daughter cells with one copy of each chromosome / two daughter cells with two copies of each chromosome	***A*** *is incorrect because mitosis results in two daughter cells with two copies of each chromosome and meiosis results in four daughter cells with one copy* ***B*** *is incorrect because mitosis results in two daughter cells with two copies of each chromosome and meiosis results in four daughter cells with one copy* ***D*** *is incorrect because mitosis results in two daughter cells with two copies of each chromosome and meiosis results in four daughter cells with one copy*	(1)

Question Number	Answer	Additional Guidance	Mark
(c)	1. because they do not have a nucleus ; 2. because they do not have (linear) chromosomes ; 3. **meiosis** does not take place because they do not {reproduce sexually / produce gametes} ;	2. ACCEPT because they have circular DNA 3.ACCEPT **meiosis** does not take place as they reproduce by binary fission	(2)

Q3.

Question Number	Answer	Additional guidance	Mark
(a)	**B** ribosome | rough endoplasmic reticulum | Golgi apparatus *Polypeptide chains are synthesised on the ribosome and then move through the cytoplasm in the RER to the Golgi apparatus where they are modified.*		**(1)**

Question Number	Answer	Additional guidance	Mark
(b)	1. idea that this is where { protein / polypeptide } synthesis occurs ; 2. using radioactive amino acids ;	1. **ACCEPT** translation 2. **ACCEPT** idea of radioactive amino acids being transported to { P /	**(2)**

Question Number	Answer	Additional guidance	Mark
(c)(i)	1. it increases between 10 and 20 minutes ; 2. it decreases after 20 minutes ;	1. **ACCEPT** between 5 and 20 minutes 2. **ACCEPT** between 20 and 40 minutes	**(2)**

Question Number	Answer	Additional guidance	Mark
(c)(ii)	1. idea that { proteins / polypeptides } { enter / are in / move through } Q 2. idea that { proteins / polypeptides } are { packaged in vesicles / transported to R / transported to Golgi apparatus } ;	**ACCEPT** { RER / eq } as alternative to Q throughout **2. ACCEPT** enter as eq to transported	(2)

Question Number	Answer	Additional guidance	Mark
(d)(i)	1. idea that some of the proteins are { for intracellular use / synthesised on free ribosomes } ; 2. idea that some of the proteins { are still in vesicles / remain in the RER / Q } ; 3. idea that some { amino acids / proteins } were in the cytoplasm ; 4. idea of radioactive decay ;	**ACCEPT** polypeptides as eq to proteins throughout answer **1. ACCEPT** idea that not all proteins need modification **1. ACCEPT** some proteins are made { in mitochondria / on mitochondrial ribosomes } **2. ACCEPT** some vesicles have not reached the Golgi / R	(2)

Question Number	Answer	Additional guidance	Mark
(d)(ii)	1. levels will decrease / eq ; 2. as proteins { move into vesicles / move into lysosome / are secreted from cell / are removed by exocytosis } ;	**1. ACCEPT** stated values below 20 e.g. zero / 5 **2. ACCEPT** due to radioactive decay /eq **2. ACCEPT** non-radioactive amino acids now being used	(2)

Q4.

Question Number	Answer	Additional Guidance	Mark
(a)	1. **controls** the growth of the pollen tube ; 2. idea of **controlling** the production of {enzymes / protein} ; 3. how these are involved in the growth of the pollen tube ;	2. ACCEPT codes for enzymes 2. NOT produces / secretes enzymes 3.e.g. they form a pathway for pollen tube /they digest the style / they produce the pollen tube	(2)
(c)(ii)	1. starch is insoluble ; 2. glucose molecules can move into the embryo (plant) ; 3. glucose can be used {in respiration / as a source of energy / eq} ;	2.ACCEPT starch cannot move into embryo (plant) 3. must be context of glucose	(2)

Q5.

Question Number	Answer	Additional guidance	Mark
(a)	Acrosome(s) / acrosome cap/acrosomal cap ;	**ACCEPT** phonetic spellings **NOT** acrosome reaction	**(1)**

Question Number	Answer	Mark
(b)	**The only correct answer is C because mitochondria are only found in the mid piece.** ***A** is not correct because the mitochondria are only found in the mid piece and therefore not in the acrosome as well* ***B** is not correct because the mitochondria are only found in the mid piece and therefore not in the nucleus as well* ***D** is not correct because the mitochondria are only found in the mid piece and therefore not in the flagellum as well*	(1)

Question Number	Answer	Mark
(c)	**The only correct answer is D as the nucleus and mitochondria contain DNA** ***A*** *is not correct because the acrosome does not contain DNA* ***B*** *is not correct because the acrosome does not contain DNA* ***C*** *is not correct because both the nucleus and mitochondria contain DNA*	**(1)**

Question Number	Answer	Additional guidance	Mark
(d)	1. allow movement (of the sperm) ; 2. to transfer (the male) { genetic material / DNA } ; 3. (from the cervix) to the ovum / eq ;	**1. ACCEPT** allows sperm to swim **3. ACCEPT** secondary oocyte /egg / egg cell as eq to ovum **3. NOT** ovule	**(2)**

Question Number	Answer	Additional guidance	Mark
* (e)	**(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)**	**Emphasis is on spelling of technical terms**	
	1. to produce *haploid* { cells /nuclei/gametes } ;	**1. ACCEPT** halving the *chromosome* number in gametes **IGNORE** ref to 23 chromosomes unless with ref to humans	
	2. reference to *crossing over* ;		
	3. credit detail *of crossing over* ;	**3.** e.g. formation of *chiasma / chiasmata* OR exchanging sections of *chromatids* OR description of breaking and rejoining	
	4. idea of (resulting in) exchange of *alleles* between *chromatids* ;	**4. NOT** genes or chromosomes	
	5. (crossing over leads to) formation of *recombinants* ;	**5. ACCEPT** new combinations of *alleles* (on chromatids)	
	6. reference to { *random / independent* } *assortment* ;		
	7. credit detail of *independent assortment* ;	**7.** e.g. { *homologous chromosomes / maternal* and *paternal chromosomes* } line up in different combinations	
	8. idea of new combinations of *alleles* in the gametes ;		(5)

Q6.

Question Number	Answer	Additional Guidance	Mark
(b)	1. the { egg cell / female gamete } contains the { nucleus / genes } of the brown mouse ; 2. alleles for brown fur are in the { egg cell / female gamete } ; 3. the alleles for brown fur are dominant / (stem cell) homozygous dominant for brown fur ; 4. idea of genetic material from { female parent / sterile mouse } not passed on to offspring ;		(2)

Question Number	Answer	Additional Guidance	Mark
(c)	1. haploid { nucleus / number of chromosomes } / eq ; 2. (haploid state) allows restoration of diploid number at fertilisation / eq ; 3. lipid { droplets / eq } to provides { energy / food } ; 4. cortical granules / eq ; 5. description of { cortical reaction / hardening of zona pellucida / eq } ;		(4)

Question Number	Answer	Additional Guidance	Mark
(d)	1. meiosis produced { haploid nuclei / genetic variation } ; 2. independent assortment of chromosomes / { crossing over of chromatids / chiasmata } ; 3. resulting in recombination of alleles ; 4. { transcription / mRNA produced } at active genes / eq ; 5. translation of mRNA produced { protein /polypeptide } ; 6. production of { protein / enzyme } which determine { cell structure / function } ;	3. ACCEPT production of recombinants. IGNORE reference to mutations 5. ACCEPT enzyme 6. ACCEPT 'proteins modify the cells'	(4)

Q7.

Question Number	Answer	Mark
(a)(i)	The only correct answer is **B** *A is incorrect because each gene is determining one character* *C is incorrect because one gene is determining several characters* *D is incorrect because it is impossible*	(1)

Question Number	Answer	Additional Guidance	Mark
(a)(ii)	{line / bar} graph to show a bell-shaped curve ;	**ACCEPT** a skewed distribution	(1)

Q8.

Question Number	Answer	Additional guidance	Mark
(a)			(4)

feature	starch only	cellulose only	both starch and cellulose	found in neither starch nor cellulose
consists of two different polysaccharides	☒			
made from β glucose		☒		
1, 4 - glycosidic bonds present			☒	
hydrogen bonds between molecules			☒	

Question Number	Answer	Additional guidance	Mark
(b)	1. bioplastics are {sustainable / will not run out} because {more plants can be grown / they are made from renewable materials / eq} ; 2. less pollution because bioplastics {reduce the use of fossil fuels / can be decomposed / are biodegradable} ;	**ACCEPT** converse statements 2. Examples of pollution reduction: e.g. do not contribute to landfill e.g. reduce CO_2 emissions	(2)

Question Number	Answer	Additional guidance	Mark
(c)(ii)	1. idea of using all five types of plastic ;	ACCEPT weight for mass throughout Answers describing using natural plant fibres should not be awarded mp1	
	2. of the same diameter / eq ;	2. ACCEPT length /width / cross-sectional area	
	3. description of apparatus set up to be used ;	3. e.g. clamping plastic between two clamp stands e.g. suspending plastic from forcemeter /spring balance or using a pulley	
	4. idea of hanging masses onto each plastic ;		
	5. recording the mass that breaks the plastic ;	5. ACCEPT recording heaviest mass that does not break the plastic 5.IGNORE recording the tensile strength	
	6. repeat for each plastic and calculate the mean ;	6. ACCEPT to improve validity	(4)